

A metal foil factory with a high-speed, in-line continuous production line uses precision die-cutting equipment to reduce waste and improve profits. However, the cemented tungsten carbide cutting edges are difficult and expensive to apply. Here is a product that can affordably bond the cutting edges to the tooling.

S-Bond™

How It Helps: The S-Bond joining process bonds dissimilar materials at low temperatures, providing new joining solutions for wear surface, thermal management, and metal-to-ceramic material applications. It can replace gluing, mechanical fastening, welding, brazing, and soldering. S-Bond's advantages over gluing include ease of rebonding, lack of volatilization or lengthy curing time, and high thermal conductivity (about 50 W/m-K). The new joining method also is less environmentally damaging than competing technologies. S-Bond uses unique alloys to actively join dissimilar materials (including metals and ceramics) without the need for special atmospheres or harsh flux chemicals.





How It Works: S-Bond lead-free alloys join even dissimilar materials in a simplified and more cost-effective way than soldering and brazing, using the same fundamental procedures. The process joins composites, ceramics, and metals, as well as graphite or any other carbon-based material. The S-Bond alloys are created by adding reactive elements, such as titanium and other active elements, to conventional solder alloy bases. In the S-Bond alloys, the active elements migrate to the joint interface and react with the joint surface compounds. Once up to temperature and molten, the S-Bond alloys become "active," permitting the active elements to diffuse into the surface of the two opposing joint materials to form a metallurgical bond. S-Bond "activation" is accomplished by pressure, brushing, and vibration, or any combination of the three.

How Much It Will Cost: Prices for S-Bond kits range from \$280 to \$995; prices for S-Bond materials range from \$190 to \$450 per pound.

When It Will Be Ready: The technology is available now. S-Bond materials are sold to electronics, electronic and optoelectronic packaging, heat exchanger, and industrial companies that are joining aluminum, stainless steels, other metals, ceramics, and composites. S-Bond's ability to behave like a glue while being a metal filler offers many opportunities for the sale of S-Bond alloys, equipment, and services. S-Bond sales were in excess of \$250,000 in 2002.



Who Is Working On It: In 2002, Materials Resources International (MRI) created S-Bond Technologies (SBT) to focus on commercial opportunities for its active solder technology. MRI employs six people and occupies approximately 6,500 square feet of office space and manufacturing facilities. In North America, SBT is responsible for the technology of lead- and flux-free, active solders that can join almost any combination of materials. While SBT benefits from MRI for its research needs, SBT serves major markets in electronics, ceramic metal joining, and simple dissimilar metals-intermetallics joining. SBT offers equipment, engineering services, and manufacturing/joining for customers. For more information, contact Dr. Ronald Smith of S-Bond Technologies at (215) 631-7111 or solution@mri-bluebell.com. The company Web site is www.s-bond.com.

MDA Origins

Throughout the 1990s, BMDO's Innovative Science and Technology program funded JPL to develop QWIP technology for use in ground-based and space-based infrared surveillance at long wavelengths. The technology could detect unheated objects such as ballistic missiles in mid-course when the hot rocket engine is not burning and most of the emission peaks are between 8 and 9 micrometers.

